Diamond Head Oil
Impact to Ground Water
NJDEP Defualt Values vs. Site Specific Values

Chemical Compound	Maximum Detected Concentration (Ph. 1 RI) (mg/kg)	Average Concentration (Ph. 1 RI) (mg/kg)	NJDEP Default IGW Criteria (mg/kg)	Site Specific IGW Criteria (mg/kg)	Comments
VOCs					
Methyl isobutyl ketone	150	10.1	-	-	No standard established (exceeded Phase 1 IGW criteria, not soil standards)
Xylenes	490	67	12	2.1	Exceeds both Phase 1 IGW and soil steadards)
Trichloroethylene	83	3.4	0.007	0.005	controlled by soil PQL; exceeds both Phase1 IGW and soil standards
Tetrachloroethylene	19	1.38	0.005	0.005	controlled by soil PQL; exceeds both Phase1 IGW and soil standards
Dichloroethylene -1,2 cis	7.6	0.66	0.2	0.025	Exceeds Phase 1 IGW standard
SVOCs					
Dimethylphenol-2,4	11	2.2	0.7	0.2	controlled by soil PQL; exceeds Phase 1 IGW
Benzo(a)anthracene	48	9.8	0.52	0.2	
Chrysene	44	10.8	52	10	Exceeds Phase 1 soil standard
Benzo(b)fluoranthene	42	6.5	1.6	0.31	Exceeds Phase 1 soil standard
PCBs					
Aldrin	0.12	0.03	0.13	0.025	Exceeds Phase 1 soil standard
Dieldrin	0.062	0.025	0.003	0.003	Exceeds Phase 1 soil standard; controlled by soil PQL
Metals					
Zinc	63700	1740	310	600	Exceeds Phase 1 soil standard
Lead	37200	2027	59	4.5	Exceeds Phase 1 soil standard
Copper	19600	685	560	7300	Exceeds Phase 1 soil standard

Notes:
Compounds listed represent examples of highest concentration data exceedances to soil IGW or NRDCSCC / RDCSCC as described in "Column F" Comments
Concentration data is from Ph. 1 RI - Table 4-15
IGW = Impact to Ground Water
RDCSCC = NJDEP Residential Direct Contact Soil Cleanup Criteria
NRDCSCC = NJDEP Non-Residential Direct Contact Soil Cleanup Criteria
Column D : NJDEP Default IGW Criteria - based on Table 1 of "Guidance Document: Development of Site-Specific Impact to Ground water soil remediation standards using the Soil-Water Partitioning Equation (June 2008)
Column E: Site Specific IGW Criteria - Developed using site specific Organic Carbon Content of Soil and Dilution Attenuation Factor (DAF) together with the NJDEP Excel Workbook for Eq. 1A & Eq. 1B of the Guidance Document

All values derived from NJDEP's partition equation
located at www.state.nj.us/dep/srp/guidance/rs/partition_equation.xls

Variable values in equation:

	Default Value	Diamond Head Site Specific Value Used
TOC.	0.002g/g	0.005g/g
DAF	13	1

Site Specific Organic Carbon Content of soil value determination based on average from 3 data points from Ph. 1 RI Soil Data:
=0.005g/g
(4300,4300,7500mg/kg)

DAF (dilution attenuation factor):
Determined by using equations located in the NJDEP's DAF guidance document

d= 32.98 (Formula)
DAF= 1.01 (Formula)

299633

DAKOTA TECHNOLOGIES
UVOST LOG REFERENCE

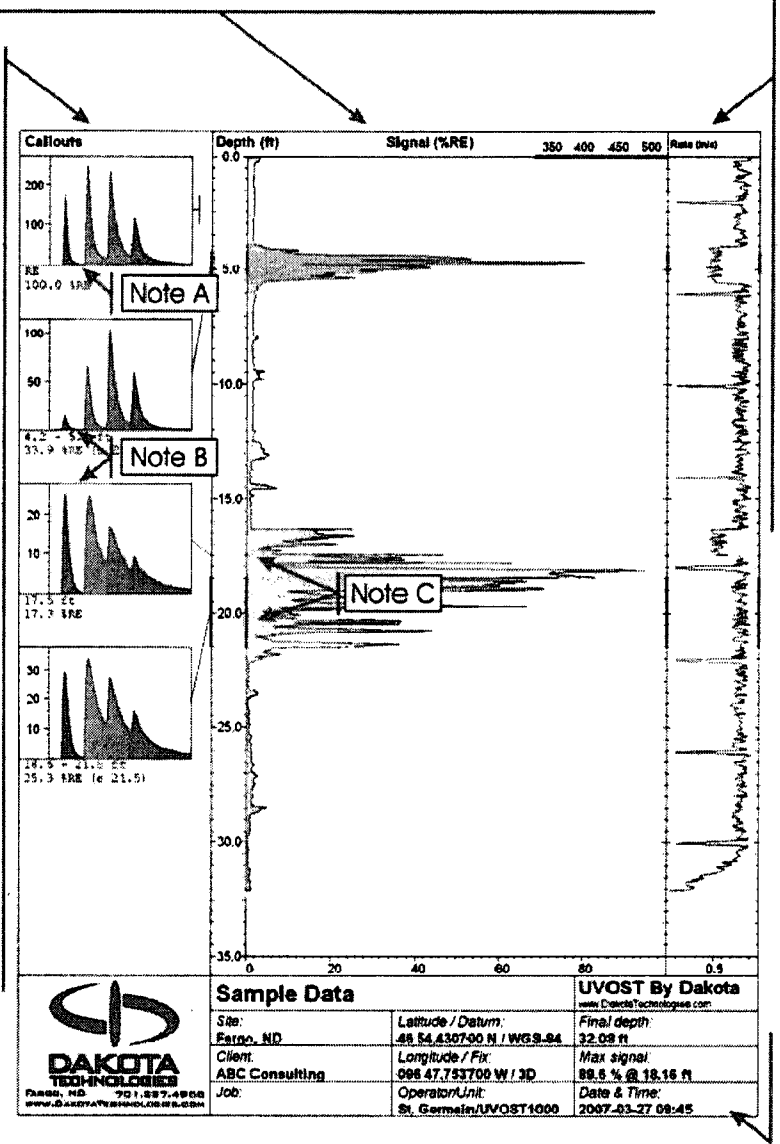
Main Plot :
Signal (total fluorescence) versus depth where signal is relative to the Reference Emitter (RE). The total area of the waveform is divided by the total area of the Reference Emitter yielding the %RE. This %RE scales with the NAPL fluorescence. The fill color is based on relative contribution of each channel's area to the total waveform area (see callout waveform). The channel-to-color relationship and corresponding wavelengths are given in the upper right corner of the main plot.

Callouts :
Waveforms from selected depths or depth ranges showing the multi-wavelength waveform for that depth.

The four peaks are due to fluorescence at four wavelengths and referred to as "channels". Each channel is assigned a color.

Various NAPLs will have a unique waveform "fingerprint" due to the relative amplitude of the four channels and/or broadening of one or more channels.

Basic waveform statistics and any operator notes are given below the callout.



Rate Plot :
The rate of probe advancement. ~ 0.8in (2cm) per second is preferred.

A noticeable decrease in the rate of advancement may be indicative of difficult probing conditions (gravel, angular sands, etc.) such as that seen here at ~5 ft.

Notice that this log was not terminated arbitrarily, but due to "refusal", as indicated by the sudden advancement rate drop at final depth.

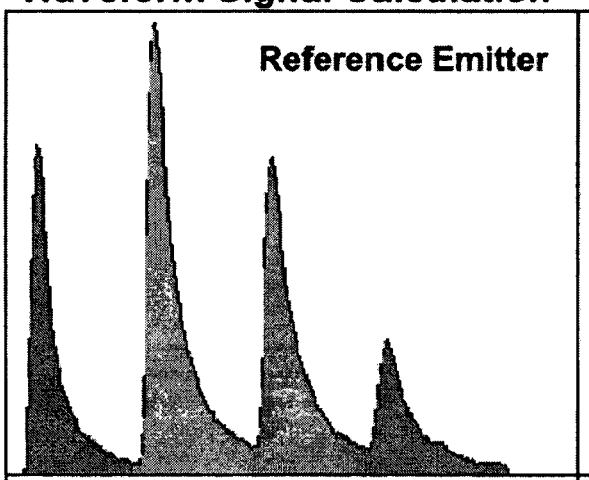
Info Box :
Contains pertinent log info including name and location.

Note A :
Time is along the x axis. No scale is given, but it is a consistent 320ns wide.
The y axis is in mV and directly corresponds to the amount of light striking the photodetector.

Note B :
These two waveforms show two different products, each with a unique waveform. The first is used motor oil and the second is diesel.

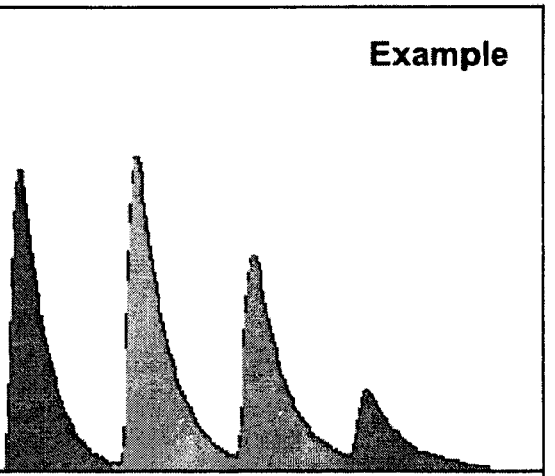
Note C :
Callouts can be a single depth (see 3rd callout) or a range (see 4th callout). The range is noted on the depth axis by a bold line. When the callout is a range, the average and standard deviation in %RE is given below the callout.

Waveform Signal Calculation



CH1		CH2		CH3		CH4		Total
4820	+	8108	+	6249	+	2984	=	**22161**
21.7		36.6		28.2		13.5		**100%**

Channel
Area (pVs)
Percent RE

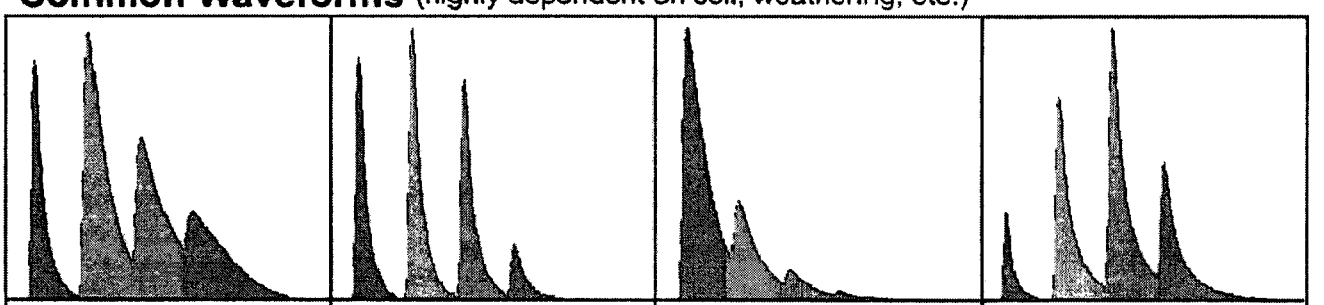


CH1		CH2		CH3		CH4		Total
4923	+	5743	+	4166	+	1735	=	**16587**
22.3		25.9		18.8		7.8		**75%**

Data Files

***.lif.raw.bin**	Raw data file. Header is ASCII format and contains information stored when the file was initially written (e.g. date, total depth, max signal, gps, etc., and any information entered by the operator). All raw waveforms are appended to the bottom of the file in a binary format.
***.lif.plt**	Stores the plot scheme history (e.g. callout depths) for associated Raw file. Transfer along with the Raw file in order to recall previous plots.
***.lif.jpg**	A jpg image of the OST log including the main signal vs. depth plot, callouts, information, etc.
***.lif.dat.txt**	Data export of a single Raw file. ASCII tab delimited format. No string header is provided for the columns (to make importing into other programs easier). Each row is a unique depth reading. The columns are: Depth, Total Signal (%RE), Ch1%, Ch2%, Ch3%, Ch4%, Rate, Conductivity Depth, Conductivity Signal. Summing channels 1 to 4 yields the Total Signal.
***.lif.sum.txt**	A summary file for a number of Raw files. ASCII tab delimited format. The file contains a string header. The summary includes one row for each Raw file and contains information for each file including: the file name, gps coordinates, max depth, max signal, and depth at which the max signal occured.
***.lif.log.txt**	An activity log generated automatically located in the OST application directory in the 'log' subfolder. Each OST unit the computer operates will generate a separate log file per month. A log file contains much of the header information contained within each separate Raw file, including: date, total depth, max signal, etc.

Common Waveforms (highly dependent on soil, weathering, etc.)



Diesel	Gas	Kerosene	Motor Oil

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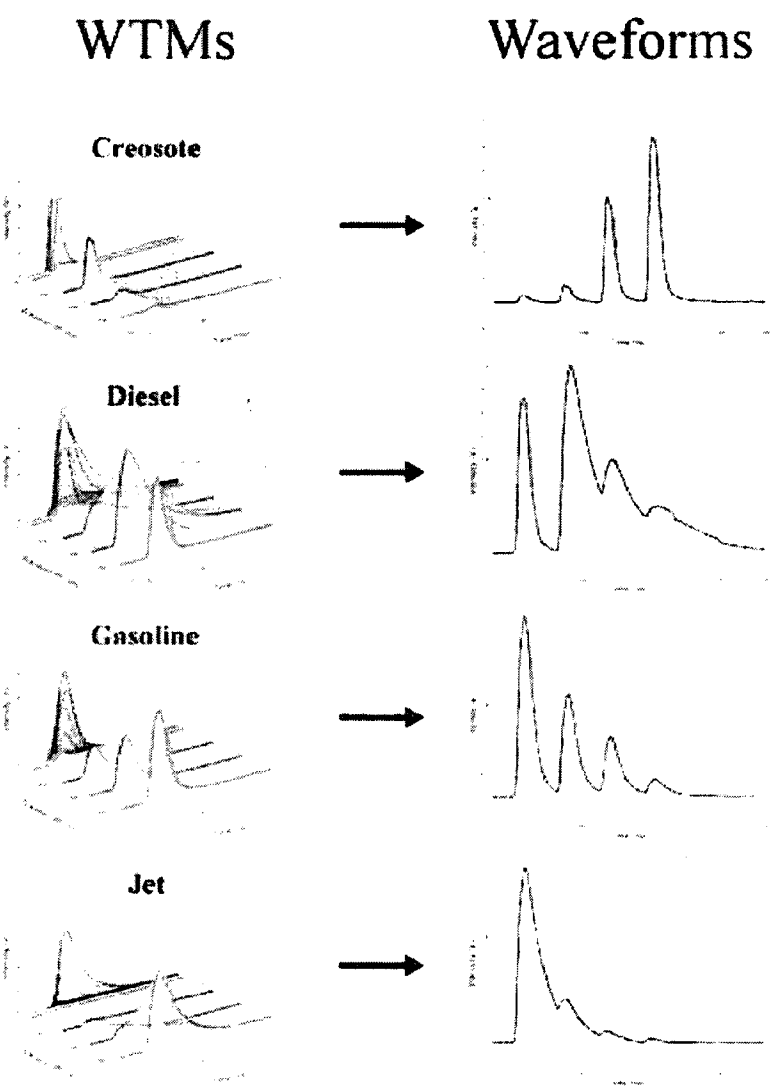
LIF Introduction

Fluorescence is a property of some compounds where absorbed light stimulates the release of photons (light) of a longer wavelength. Fluorescence, a property of many aromatic hydrocarbons, can be used detect small amounts of substance in/on a much larger matrix. Here we will discuss the use of Laser Induced Fluorescence (LIF) for purposes of site investigation.

The fluorescence of PAHs has both a spectral and temporal component. Real-world environmental samples typically contain at least several (if not dozens) of different PAHs along with other fluorophores, and the PAH fluorescence spectra overlap to form broad and fairly featureless spectral a (compared to pure PAH spectra). If we were to record the temporal decay waveforms across the entir what is called a wavelength-time matrix (WTM) that would describe the fluorescence emission comple monitor four unique bands of this emission in real-time.



WTM's of common fuels

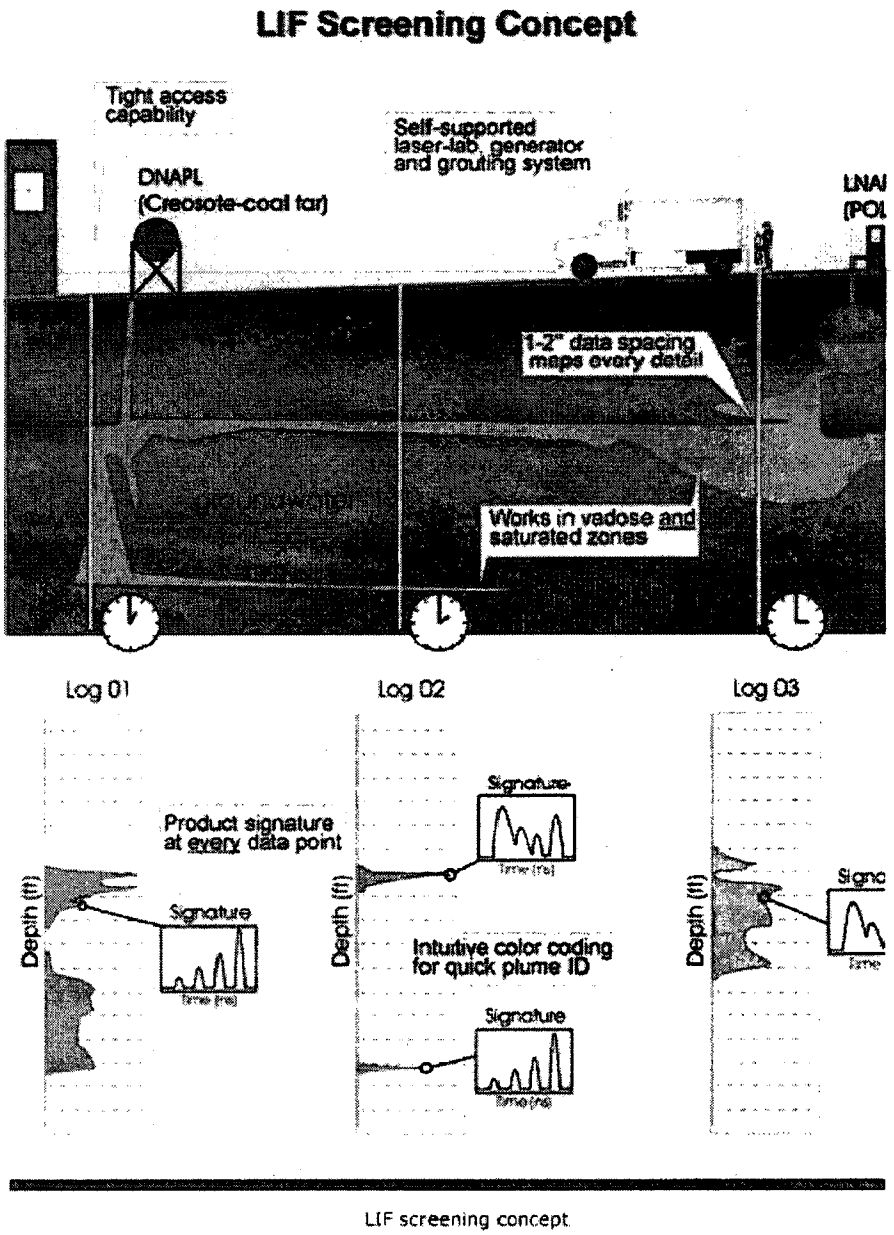
How It Works

The system developed by Dakota sends excitation light through fiber optic cable strung within rods. Tl window in the side of the probe. As the probe is advanced the soil is exposed to the excitation light. If exist (i.e. contaminants) light is emitted. The "signal" light is transmitted through a fiber, back up hol are indicated in real-time on a graph of signal vs. depth. The graph can also display color logs and wa identification of the contaminant present.

Benefits of LIF

- Production rate - 200 to 400 ft. per day depending on soil conditions and grouting methods.
- No samples - LIF collects and displays data in real time. Therefore no samples are collected.
- Decontamination - With a special rod wiper and no sampling equipment, decontamination is virtu
- Quick results - Results can be printed out before the rods can be extracted from the ground. Prov

making and results in a true seek-and-find style of site characterization.



LIF screening concept

Publications

"In situ Characterization of NAPL with TarGOST® at MGP Sites" (external link, valid 2006-07):

and T. Rudolph, Land Contamination & Reclamation, 14(2), 573-578(6) (2006)

"Case study: confirmation of TarGOST laser-induced fluorescence DNAPL delineation with s link, valid 2006-07): M. B. Okin, S. M. Carroll, W. R. Fisher, and R. W. St. Germain, Land Contaminat 573-578(6) (2006)

"Demonstration of a Method for the Direct Determination of PAHs in Submerged Sediments' 07): T. Grundl, J. Aldstadt, J. Harb, R. St. Germain, and R. Scheweitzer, Environ. Sci. Technol., 14(2)

"An In-Situ Laser-Induced Fluorescence System for Polycylic Aromatic Hydrocarbon-Conta Sediment" (external link, valid 2006-07): J. Aldstadt, R. St. Germain, T. Grundl, and R. Scheweitzer, Environmental Protection Agency, Great Lakes National Program Office (2002)

"Chemometric treatment of multimode laser-induced fluorescence (LIF) data of fuel-spiked 2006-07): M. H. Van Benthem, B. C. Mitchell, G. D. Gillispie, and R. W. St. Germain, Advanced Techr Monitoring and Remediation, Tuan Vo-Dinh, Editor, Proc. SPIE, 2835, 167-179 (1996)

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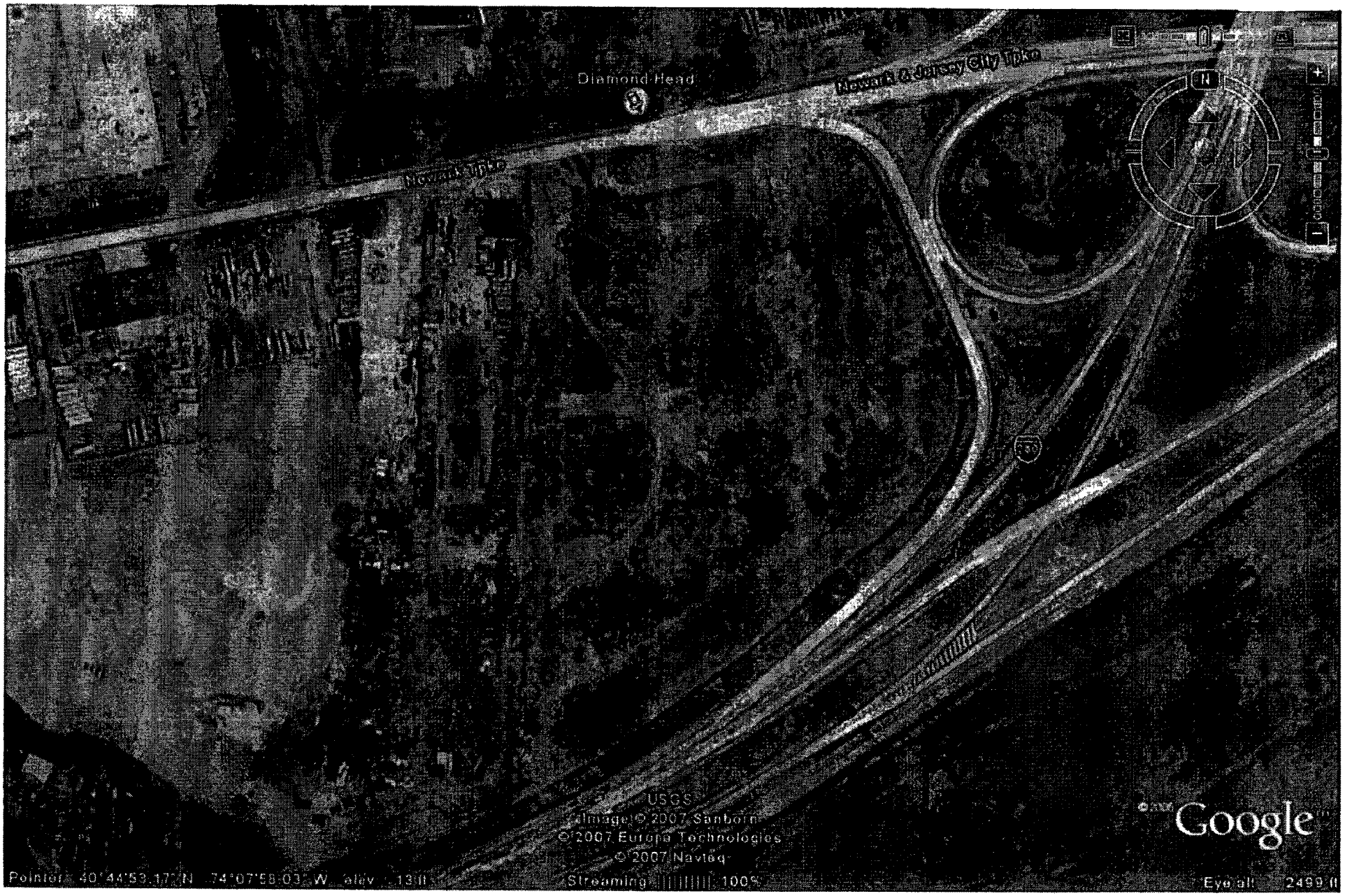
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Streaming 100%
Eye alt 2499 ft